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PHILOSOPHICAL TRANSACTIONS.

April 12. 1669.

The Contents.

Promiscuous Additions to what was formerly publish'd concerning Vegetation. Some instances, shewing the Correspondence of the Pith and Timber with the Seed of the Plant, as also of the Bark or Sap in the Bark with the Pulp of the Fruit. An Extract of a Letter, giving further directions about Melons. A summary account of the Rules of Motion, by M. Hugen. A narrative concerning the Resolution of Equations in Numbers, by M. John Collins. An Account of two Books, I. PRÆLUDIA BOTANICA Roberti Morison, M. D. II. CL. SALMASII Præfatio in librum de HOMONYMIS HYLES JATRICÆ: Eiusdem de PLINIO IUDICIUM. Divione, A. 1668. in quarto.

Promiscuous additions, made by Dr. Tong, to what was communicated by the same in Numb. 43. and 44. concerning Vegetation.

I. **F**OR perfecting the experiment of *Sap*, and to find out, whether it ascends more or less in the priet Circles of the Body, then in those betwixt the Body and Bark; let the tree, exempted from all its sap the day before, be first peirced with an Auger, only through the Bark, and the quantity of Sap it yeilds, exactly measured and weighed: Then at the same time let also another hole be bored into the

N n n n

body

Body of the tree about $1\frac{1}{2}$ inch deep, and so round, on every side of the same tree, and of others of the same sort, (all exhausted of their sap the day before) some deeper and some shallower, with a good large Auger; and one quite through, sloaping. From this experiment, after divers and various trials, may be found the difference of the Sap rising on the North and South in Sun and shade, and so likewise from that which comes from the Bark, and that which ascends in the inner part of the tree. The weight also may be compared of that, which issues from the Bark, with that which issues from the Body. The internall heart-sap may also be drawn apart, by boring a *Smaller* auger-hole in the middle of a *Greater*, and fitting it with a long pipe adjusted into the inner orifice. If no difference be found in these, by distillation after fermentation, nor otherwise, the presumption will be greater, that the difference of *Heart* (as when they call *Heart of Oak*) and Sap in Timber is not from the plenty or scarcity of sap, but from the season of felling.

2. From the observation of the woody Circle or pricks in the Branch, Arm or Body of a tree, it may be inquired, whether at such time when that Circle first encompass'd next the bark, the tree be or be not more subject to corruption, than at another season, when the jelly of the juyce is grown more condensed? I am inform'd by a curious and intelligent person, that the corruption of the Timber depends not upon the time of the year, and the ascent, or the plenty or scarcity of Sap so much, as upon the season of the Moon or Wind. And he affirms, that Timber-trees fell'd, when the wind is in the West, especially in the Old Moon, will keep them free from grubs (as they call it) *i.e.* from being worm-eaten; and on the contrary, that when cut down in an *East* winde, the worm will seize on them, in what season of the Moon soever it be fell'd: To prevent which corruption, 'tis advis'd, that such timber should be forthwith thrown into water. It's indeed worth inquiring, whether we may not ascribe something of the durableness of timber to the perfect condensation of the outward integument or coat, and so take care, that when trees are to be fell'd for timber or other durable materials, the outward coates may be of solid wood.

3. *Ethelbert Fay*, an ingenious and expert planter in *Lemster*, supposeth, that the fittest time to inoculate is presently after mid-summer, because (*saieth he*) the Sap descends; but I say, because 'tis then most plentiful, and begins to jelly. The same ascribes it to the sap ascending, to take the bud inoculated *before* mid-summer; and to the Sap descending, to take it *after* mid-summer. The time he limits to a few days before mid-summer, and to 8. or 10. dayes after it. *Mr. Austin* limits 14 dayes before, and as many after; and would have the bud unty'd after 14. days, as I remember.

4. It is all one, whether the Sap be exhausted below, by being converted into wood, roots, or other uses; or by diversion, as when the branch is cut, or the bark opened below: The Sap in both cases descends or rather sinks indifferently to supply the defect, and heal the wound; and so it comes to pass, that there being about mid-summer the greatest plenty of sap in apple-trees, a bud then inoculated will thrive, especially before mid-summer; for then it drawes its share in the Sap ascending, and, all the necessary uses of the upper branches being serv'd, it partakes of the flood of the abounding and superfluous Sap, remitted to it from them.

5. Hence I conclude, that to gird a tree at a convenient distance above the inoculated bud before mid-summer (so as is practised to stay the bleeding of Vines, to gird them below) is an experiment worth trying; that we may know, whether it will cause a stronger shoot of an inoculated bud or no? Or whether it be better, to cut off the head of the stock above the inoculated bud; which my friend informes me will make a better shoot, than in the usual inoculation, if this be done a few dayes before mid-summer. Further, when you gird, it must be tryed in several trees, whether girding long before mid-summer will not stay the ascent of the sap, and cutting of the head, much more? Whereby time may be gained by retarding the season of inoculation, to their benefit, who have very many to inoculate; and in wet season to stay for dry weather, onely fit for this work.

6. If then the Sap in it's subsiding be so considerable in the matter of inoculation, it seems, that inoculation will hold best

and longest in season in the Root. For I have observed the Sap to subside unto the Roots out of the Body at such times of the day and year, when in the Branches I found none to spare.

7. If Binding, or Cutting off the Head advances the shoot of the inoculated bud, then it ought to be experimented, Whether disbarking a few days before Midsummer on the contrarie side, a little below the bud, and having wax apply'd or clay on the part disbark'd, may not by that direction of the Sap, necessitating it to pass by the bud, further its growth considerably; or, which is better, a gash cut in the wood in that place.

8. To make a barren Tree beare again, cherish, dung in trenches, and pare and renew the extremity's of its longest Roots, and cut off the outermost and shortest, nearest the Body. Hence it may seem, that Plowing helps Fruit-trees.

9. Crosse hackings promote fruitfulness, cure the *Phyllomania*, whereof the reason seems to be, that (as was above intimated) Outward Circles and Bark feed the Wood, and the Inner onely reach out to the uttermost spriggs of the last year, to which the Fruit is appendant. For, some Trees bear only on this years shoot, and some only on that of the last, possibly some only on the third years shoot; and cease bearing, when they shoot no new spriggs. Seasonable baring the Roots, which they call *Ablaqueation*, probably hath the same effect, because it hinders the nourishment especially of the outward coates, and of barke, leaves, and suckers: But, because it seems, that, as some suckers or shoots, lately sprung in outward coats, robb the fruit of the risen Iuyce, so later roots, come from the outward parts of the maine roots, rob them also of their first nourishment in the earth; they ought to be pruned, as well as all suckers and not-bearing branches and spriggs, every year. For which reason also, the better to increase and amend fruit, it may be observed, what was recommended above to the 15th *Querie*, viz. The applying of dung and other amendments in trenches nigh to and beyond the farthest points of the Roots, to draw them out of the shade and drops. To this end, Distance and Situation is to be observed.

10. One of the best ways of obtaining the greatest store of Sap in the shortest time from the Body of any Tree, is, Not only to pierce the Bark, nor to cut the Body with a chisel, almost to the Pith, (as some have directed,) but quite thorow all the Circles and the inner Rind it self, on both sides of the Pith, leaving only the outermost Circle and the Bark on the North-East-side unpierced. But this hole is to be bored sloping upwards, as large as the biggest Auger, you can get, will make; and that also thorough and under a large Arm near the ground. So will it not need any stone to keep open the orifice; nor Spigot, to direct the Sap into the Receiver. This way, the Tree will in short time afford liquor enough to brew with it. And with some of these sweet Saps one bushell of Malt will make as good Ale, as four bushels with ordinary water, though you should brew even in *March*, held the properest time for brewing in regard of the goodness of the water at that season. *Sycamore* I take to yeild the best brewing Sap, being very sweet and wholesom.

11. To preserve Sap in the best condition, for Brewing; what you gather first, must be insolated by a constant exposure of it to the Sun in Glasses or other fit vessels, till the rest be gather'd and ready; otherwise it will soon contract an acidity. Having been thus expos'd to the Sun, till a sufficient quantity is collected; put into it so much very thin cut and hard tosted but no ways burnt Ry-bread, as will serve to ferment it; and when it works; take out the Bread, and bottle the liquor, stopping it up with waxed Corks. If you bake *Sage* or any other Medicinal herbs in such thin Ry-paste, till they be very dry, you may expect a very wholesome drink. If you put a few *Cloves* in every Glas, into which the Sap runs from the Tree, it will certainly keep a twelfth-month. But I have wonder'd, whilest I observ'd, How speedily it drew the tast and tincture of the Clove. In some few bottles I was so happy as to draw out my Cloves, with a cloth, in which I tyed them up, in such a season; as not to change colour nor taste; and yet I preserv'd the Birch-sap by that slight fermentation above a twelfth month without any alteration; which else would have sowr'd in a few days.

12. Some propose *Oyle* of *Sulphur* to perfume the Bottles with. I know not, whether that alter the tast; or onely stay the naturall fermentation; or what other change it gives the Sap.

13. *Spirit* of *Wine* ferments the Iuyce of some Berries, and possibly may not only preserve but advance the vertue of Saps; a little being powred on the top of them in the bottles; or some other Oily Spirit.

14. *Raisins* infused in the liquor of *Birch*, is one Ingredient of the *Durham-Gardner*. I have been inform'd, that he uses *Sugar*; but I beleive, he puts it not in, till he opens a Bottle, presently to be drunk, because it maketh the liquor sparkle in the Glasse.

15. A certain Lady ferments it with Ry-toft, not put in but only hung over it, in such quantity and at such distance, as may give some light warmth, motion and alteration to the surface of the liquor.

16. I fermented some with Ale-barm, which converted my delicat *Birch-Iuyce*, kept in Bottles, into pitifull small beer, which I wondred at; for I know one, who used by the barm of Ale to improve smal Beer, and thereby to keep it the better in Vessels.

17. I perswade my self, that *Birch-water* fermented by the *Flemish Wheat-ferment*, without any barm, would in time be excellently matur'd in Bottles; but not in a small time.

18. Let *Cinnamon* also be try'd among the Ferments of these Iuyces. *Hony* will not mixe with *Cyder* though boyl'd therein to make Meath; but after a while the *Cyder* lets fall the *Hony*, and becomes simple *Cyder* again; Q. Whether it will not be so also in *Birch-sap*?

19. Some affirm, that the Tops and Leaves of *Birch*, decocted in the Sap, will preserve it from Sowing the whole year; and that any sort of dry'd Aromatick herbs, as *Sage* &c. boyled in beer, will keep it as well as *Hops*, *Ling* (*Heath*) *Broom*, or *Worm-wood*. I had a friend, who us'd *Bay-leaves* in his Beer and Ale. These things I propose to tryall, with green leaves and tops of the same year; decoct and dry leaves and herbs, infus'd or boyl'd, of former. The inner Bark yields *Oyle*, and probably, when infus'd, will preserve Iuyces. So you have *Oyle*, *Vinegar*, and *Wine* from our own native Trees.

20. Delicate

20. Delicate and light *French Manchet*, toasted, may possibly be also good for our Sapps.

21. For the clearing of what was delivered *Num.* 43. p. 858. about *prickt Circles* in Trees, it may be added, That those *Circles* are suppos'd to be at some time of the year of one single row of *pricks*, and at some season, of more, and at others, of solid wood. *Quere*, 1. What alteration is found in *Circles* of *Pricks*, or *Wood*, in Spring, at Midsummer, and in Autumn &c? 2. Whether these single or double *Circles* of *pricks* and coats of *Jelly* or wood, increase betwixt the inner and outward bark, or not? Or, betwixt the one and both of the barks, *i. e.* on one or both sides of the inner bark? I conceive, it doth on both sides of the inner bark, so that in some thick outward *Barks* those *Circles* may be observ'd, as in *Wood*. 3. Whether the Tree receives increase in all its inner coats, so as every coat yearly grows thicker, or in the outtermost only, or in some of the outward coats also?

Dr. Iohn Beals Instances

Promised in Numb. 42. and intended to shew the Correspondence of the Pith and Timber, with the Seed of the Plant; and that of the Bark or Sap in the bark, with the Pulp of the Fruit, or some encompassing Coat, or Cod, containing the Seed.

The Author having prefaced, that he can promise no Method in the following Communications, gives these Instances.

First, *saith he*, I had an excellent *Summer-Apple*, containing abundance of very pleasing Iuyce. It was of that kind, which never grows large. The Body by the burthen of the fruit always wreath'd towards the ground; the Branches all curl'd, and full of knots at every turning; and these branches apt to grow, if a good knot be set in the ground, as soon as 'tis cut off, especially about *Candel-masse*. This Tree was hollow, and very near all the Timber extremely rotten from the top of the Stem to the root; and every sprigg, how small however, appear'd Cork-color'd and rotten at the heart of the Timber. And so it was generally all over the Roots; and 'tis like, it had been so many years before: Yet the Tree bore abundantly.